Niveau(x) d'enseignement: 7 Numéro EDUQ : 8270342
Centre d'intérêt: 58

Lucia, M. Howard C.

An investigation of the effects of teaching "appropriate study habits" upon the recall of course material : final report / by M. Howard C. Lucia and Gerald R. Cutting. -- Lennoxville : Champlain Regional College, Lennoxville Campus, 1975.
vi, 46 f. : 5 graph. ; 28 cm.

Bibliographie: f. 37-38.

Cote Dewey: 371.3'028/L937i Cote LC: LB/1049

Descripteur(s): *Méthode d'apprentissage *Habileté d'apprentissage *Rendement scolaire *Echec scolaire *Etude *Collégial (Niveau)

Identificateur(s) de nom: *Collège régional Champlain. Campus Lennoxville (Québec) *McGraw-Hill study skills test

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Dans plusieurs cégeps, on relève un taux impressionnant d'échec chez les étudiants de première année: 10% des nouveaux venus échouent 50% et plus de leurs cours dans un semestre. L'étude vise un double objectif: évaluer le degré d'habileté d'apprentissage des cégépiens et voir si l'enseignement de méthodes d'apprentissage peut favoriser l'amélioration du rendement scolaire.

Deux expériences ont été réalisées en 1974-1975. La première vise à vérifier si les habiletés d'apprentissage des étudiants du collégial diffèrent de celles des étudiants américains qui ont servi à la normalisation du "McGraw-Hill study skills test": 412 des 580 étudiants de première année du Campus de Lennoxville ont participé aux sessions de test tenues à l'automne 1974. Le test mesurait quatre échelles d'habiletés: "problem solving", "Underlining", "Library information", "General study skills". Dans la deuxième expérience, on a utilisé un groupe expérimental et un groupe de contrôle de douze étudiants chacun pour vérifier si l'application d'un "Study skills instructional program" permettait d'obtenir un meilleur rendement au test et un meilleur rendement scolaire.

Les constatations suivantes se dégagent de l'étude: 1. les étudiants du Campus de Lennoxville sont généralement plus faibles que ceux des Etats-Unis en ce qui concerne les échelles "Library information" et "General study skills"; 2. le test utilisé n'est pas un bon instrument pour prédire le rendement scolaire mais il en est un pour diagnostiquer les difficultés scolaires; 3. par rapport aux étudiants en sciences sociales, les étudiants en sciences pures et appliquées ont un rendement supérieur dans l'ensemble du test et plus particulièrement dans les échelles "Problem solving", "Library information" et "General study skills"; 4. l'enseignement de méthodes d'apprentissage exerce un effet positif sur le rendement scolaire.

Type de document: r
Région(s) administrative(s): 05
Financement: Bénéficiaire - Collège régional Champlain, campus de
Lennoxville
Organisme(s) source(s) - MEQ - DGEC
Programme(s) de subvention - PROSIP
Auteur de l'analyse: fr

E D U Q 8270342

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Le 28 août 1975.

SEP 1975
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Monsieur Andréa Bouchard,
Directeur du Service de la
Recherche et du Développement,
Direction de l'Enseignement collégial,
1035, rue de la Chevrotière,
Québec, P.Q. G1A 1H8

Sujet: Projet de Recherche No. 108 (1974-75):
"An Investigation of the Effects of Teaching 'Appropriate Study Habits' upon the Recall of Course Material."

Cher Monsieur Bouchard,

Ci-inclus veuillez trouver une copie du rapport du projet de recherche que j'ai complété. J'en fais parvenir une copie à chacun de vos deux adjoints. Malheureusement, des difficultés d'impression ont retardé l'envoi de ce rapport.

Après avoir lu ce rapport qui contient d'intéressantes conclusions, j'apprécierais vos commentaires. Je crois sincèrement que la recherche dans ce domaine devrait être continuée. Cependant, il ne me reste qu'une année pour compléter mes recherches en vue de mon doctorat en psychologie et je me dois de présenter ma thèse cette année. J'aimerais bien prolonger le projet ci-haut mentionné au cours de l'année 1976-77 et j'en ferai la demande selon les procédures à suivre, espérant recevoir votre encouragement à nouveau. Je vous réitère mes sincères remerciements de l'appui financier que vous m'avez accordé à date.

Veuillez agréer, cher Monsieur Bouchard, l'expression de mes sentiments les plus distingués.

Howard Lucia

Howard Lucia,
Recherchur principal

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P.S. J'expédie une copie au Centre de Documentation.

E D U Q 8270342

AN INVESTIGATION OF THE EFFECTS OF TEACHING "APPROPRIATE STUDY HABITS" UPON THE RECALL OF COURSE MATERIAL

by

H. HOWARD C. LUCIA

and

Gerald R. Cutting

Champlain Regional College

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FINAL REPORT

Submitted to: M. Andrea Bouchard
Directeur de Service de la Recherche et du Development

Copies to: M. Jean-Paul Broudéheux
M. Pierre-Gingras

June 30, 1975

ABSTRACT

Four hundred and twelve (412) students served as subjects for Exp. I. Designed to standardize the McGraw-Hill Study Skills test for Quebec C.E.G.E.P. students at Champlain Regional College, Lennoxville Campus, Exp. I found these students in general to be weaker than similar U.S. students in: (a) Library Information, and (b) General Study Skills; $p < .005$. It was determined that the McGraw-Hill Study Skills test was not a good predictor of College Academic Performance, but it was a good diagnostic tool for students experiencing academic difficulties at college. Pure & Applied Science students when compared to Social Sciences students demonstrated: (a) a statistically significant relative decrease in academic performance between High School and College; $p < .005$, and (b) superior performance on the McGraw-Hill Study Skills test for the Problem Solving, Library Information, General Study Skill, and Total Study Skills scales.

In Exp. II an Experimental and a Control group (12 students each) was used to demonstrate that a Study Skills Instructional Program resulted in: (a) improved performance on the McGraw-Hill Study Skill test, and (b) improved College Academic Performance when post- and pre-instructional measures were compared. Recommendations were presented for further research which would lead to applied Study Skills Programs.

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ACKNOWLEDGEMENTS

I wish to express my appreciation to the Department of Education of the Province of Quebec, whose financial support made this research project possible. Special thanks are extended to Mrs. M. Rohrberg for her diligent efforts as research assistant and as "idea-evaluator". Special thanks are similarly extended to Mrs. R. Thompson who typed, re-typed, and patiently tolerated the many crises of this research. My sincere appreciation is extended to all members present and past of Champlain College for: (a) their support on my behalf in order to obtain the project grant, (b) their belief in the worth of the project, (c) their assistance in making available necessary data, and (d) their arrangement of administrative details that researchers usually neglect.

I would also like to thank Dr. D.D. Smith of Bishop's University for supplying some invaluable materials and ideas, expecially for the instruction of students in improving their study skill techniques.

I would furthermore like to publicly thank each and every one of the 412 students who actively participated in this project. Without their help and co-operation, none of this would have been possible! I sincerely hope this research may, if only in some small way, contribute to the achievement of their academic goals--- if so, some of my

indebtedness will be repaid!

Lastly and by no means least, I would like to thank my wife Jannine. She accepted my fluctuations in mood, which, like a barometer, indicated each stage and the frustrations of the research, like any research project. At the end, blind elation--- but with her support I will continue to be involved in research projects; again, and again, and again...

A distressing occurence in some C.E.G.E.P.s' (General and Vocational Colleges of Quebec) is the ten (10) percent of entering students who fail fifty (50) percent or more of their courses in a semester. These students must apply for readmission to the college, presenting committee members with some difficult questions. Why do some students fail such a large number of courses? Lucia (1973) hypothesized from evidence based on one course (Psychology 350-102) that some students fail college courses due to poor study skills. The purpose of this research was to: (a) evaluate the level of study skills of C.E.G.E.P. students, and (b) to see if teaching study habits would improve academic performance.

Various methods of instruction in study skills have been investigated (Entwistle, 1960; Fox, 1962; Jones, 1969; and Ritter, 1971). Another approach has been to relate study skills and/or personality characteristics to academic performance in university (Cowell & Entwistle, 1971; Entwistle & Entwistle, 1970; Entwistle & Wilson, 1970;

Jackson & Van Zoost, 1972; and Kusyszyn, 1970). Jackson and Van Zoost as well as Kysyszyn did not find any improvement in academic performance corresponding to improved study skills. Jackson and Van Zoost's study used independently sampled treatment groups to assess changes in academic performance. This design confounded in one estimate, both within and between groups variance, thus reducing the likelihood of demonstrating a significant study skills effect upon academic performance. The present study used pre- and post-test measurements of an Experimental and matched Control group to assess the effects of teaching Study Skills upon College Academic Performance.

It was hypothesized that C.E.G.E.P. entering students would differ from the standardizing groups of U.S. students on the various scales of a study skills test. It was further hypothesized that teaching study skill techniques would improve College Academic Performance.

Because some aspects of the research pertains to C.E.G.E.P.s' in general whereas others pertain only to the Lennoxville Campus, I have endeavored to make these distinctions clear.

EXPERIMENT I

Experiment 1 was designed to evaluate whether first year C.E.G.E.P. students differed in study skills from United States groups used to standardize a study skills test. A table of percentile ranks was

established for C.E.G.E.P. students at the Lennoxville Campus of Champlain Regional College.

METHOD

Subjects.--- The subjects were 412 of 580 first-year C.E.G.E.P. students (Mean Age = 17.7 years) attending Champlain Regional College, Lennoxville Campus, who agreed to participate in a testing session administered by a research assistant. Testing sessions were held in each first-year humanities course during the first four (4) weeks of the semester.

Apparatus and Material.--- The McGraw-Hill Basic Skills System, Study Skills Test (1970), Form A was used to measure Study Skills on the following scales: (a) Problem Solving, (b) Underlining, (c) Library Information, and (d) General Study Skills.

Procedure.--- On the testing day, each subject filled out a personal information card prior to answering the test. The nature and goals of the test were explained. Two (2) sample questions were given to familiarize the subjects with the test procedures. Each of the four (4) sections of the test,(Problem Solving, Underlining, Library Information, and General Study Skills) was immediately preceeded by specific directions. Each part was separately timed. All subjects received the results of their test as a raw score and percentile rank by mail within three (3) weeks of testing. If they did not understand their test results the subjects were encouraged to come to the researcher's office for further explanation.

Results and Discussion.--- Data was collected for each subject pertaining to: Age, Sex, Last High School Attended, High School District, Average Grades in the Last Year of High School, Number of Courses Failed in the Last Year of High School, College Program, First Semester Average Grades at College, Number of Courses Failed at College, Problem Solving score, Underlining score, Library Information score, General Study Skills score, and Total Study Skills test score. All data was coded on computer cards for analysis using the IBM subroutine, Statistical Package for the Social Sciences. The raw data in the form of a computer print-out has been provided in Appendix I.

To facilitate students' interpretation of their Study Skills test results, a table of raw scores and the corresponding percentile rank was produced for each Study Skill scale (see Table 1). It should be noted however, that until further standardizing research is undertaken within the Quebec C.E.G.E.P.s', these percentile ranks are limited in their applicability to Champlain Regional College, Lennoxville Campus.

.....

Insert Table 1 about here

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An analysis was performed comparing the mean score (N=412 C.E.G.E.P. students entering college in the fall semester) for each measure of the McGraw-Hill Study Skills test to a comparable mean score for the 'McGraw-Hill standardization sample' of U.S. students. The C.E.G.E.P. students

TABLE 1

TABLE FOR CONVERTING RAW SCORE TO PERCENTILE RANK FOR CEGEP STUDENTS

% ile Rank	FORM A					% ile Rank	FORM A				
	Pt 1	Pt 2	Pt 3	Pt 4	Tot		Pt 1	Pt 2	Pt 3	Pt 4	Tot
99	14-15	10	17-20	17-20	49-65	49					35
98						48					
97			16	16	48	47					
96	13	9				46					
95					47	45			10		
94						44	9				
93			15	15	46	43					34
92					45	42					
91						41					
90					44	40					33
89	12					39					
88						38					
87						37				10	
86		8	14		43	36		5			
85				14		35					
84						34			9		32
83						33					
82						32					
81					42	31					
80						30	8				31
79						29					
78			13			28					
77	11				41	27				9	
76						26					
75					40	25					30
74						24					
73						23			8		29
72				13		22					
71						21					
70		7			39	20		4			28
69			12			19					
68						18				8	
67						17					
66						16	7				27
65						15					
64						14					
63				12	38	13			7		26
62						12					
61	10					11				7	
60						10					25
59						9	6				
58					37	8		3			
57						7			6		24
56						6				6	
55			11			5			5		23
54						4					22
53					36	3	5	2	4		21
52						2				4-5	19-20
51		6		11		1	0-4	0-1	0-3	0-3	0-18
50											

Note.--- Pt 1 - Problem Solving
Pt 2 - Underlining
Pt 3 - Library Information
Pt 4 - General Study Skills
Tot - TOTAL - Study Skills Score

had significantly lower scores on: (a) the Library Information scale, t (1367)= 8.16, $p < .005$, and (b) the General Study Skills scale, t (1367)= 8.43, $p < .005$. The Problem Solving, Underlining, and Total Study Skills scales, however, did not result in any significant differences between the two standardization samples (See Table 2).

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Insert Table 2 about here

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This finding might indicate that C.E.G.E.P. instructors should ' take into account ' these student weaknesses when planning their courses and giving library assignments. 'Taking into account' should not mean avoiding these deficiencies, but rather encouraging the students to improve upon their particular weakness or weaknesses through the use of relevant discussions and assignments.

In order to begin assessing the ability of Study Skills Test results in predicting College Academic Performance, a multiple step-wise linear regression analysis was performed. Average grades in the first semester college examinations were used as a dependent measure to be predicted from a linear multiple regression line derived from such variables as: (a) Sex, (b) Age, (c) Average Grades in High School, (d) Problem Solving score, (e) Underlining score, (f) General Study Skills score, (g) Library Information score, and (h) Total Study Skills score. Although the regression equation was successfully obtained, the final multiple-r of

TABLE 2

MEAN SCORES AND t-TESTS
ON THE SCALES OF THE
McGRAW-HILL STUDY SKILLS
TEST FOR U.S. AND C.E.G.E.P.
STUDENTS.

STUDY SKILL	C.E.G.E.P. STUDENTS (N = 412)		U.S. STUDENTS (N = 945)		t-TESTS FOR U.S. vs. C.E.G.E.P. STUDENTS	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	df	t
PROBLEM SOLVING	8.80	2.27	8.83	2.44	1355	-0.21
UNDERLINING	5.35	2.00	5.37	2.04	1355	-0.19
LIBRARY INFORMATION	10.01	3.18	11.57	3.37	1355	-8.16*
GENERAL STUDY SKILLS	10.47	2.99	11.95	2.93	1355	-8.43**

NOTE.--- * $p < .005$, two-tailed

0.46 compared unfavorably with Pearson Product-Moment correlation coefficients derived for Average Grades in High School (r=0.43), and a similar value of r=0.20 for the Total Study Skills score (see Table 3). Because the Pearson Product-Moment correlation coefficient relating Average Grades in High School with Academic Performance at College reflects a linear relationship from which 18.49% of the total variability is explained; and because the multiple-r of 0.46 similarly accounts for 21.16% of the total variability, an increase of only 2.67% in explained variability results from such a complex analysis as Multiple Step-Wise Linear Regression--- it may be tentatively concluded with the present state of knowledge, that Average Grades in High School remain the single most powerful predictor of College Academic Performance.

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Insert Table 3 about here

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From a careful inspection of Table 3, it can be seen that more statistically significant correlation coefficients are obtained when Study Skills scores are correlated with High School Academic Performance than with College Academic Performance. Such an observation suggests once again that Study Skills Test results are not good predictors of College Academic performance. The fact that every scale resulted in a statistically significant correlation when combined with High School Academic Performance was totally unexpected. While the present research was not designed to

TABLE 3

PEARSON PRODUCT-MOMENT CORRELATIONS
FOR HIGH SCHOOL AND COLLEGE AVERAGE
WITH STUDY SKILL SCORES

STUDY SKILL	HIGH SCHOOL AVERAGE (N= 403)	COLLEGE AVERAGE (N= 405)
PROBLEM SOLVING	0.3078***	0.0677
UNDERLINING	0.2674***	0.1509**
LIBRARY INFORMATION	0.3343***	0.2045***
GENERAL STUDY SKILLS	0.2532***	0.1178*
TOTAL STUDY SKILLS SCORE	0.4210***	0.1970***

NOTE.--- * $p < .05$
** $p < .01$
*** $p < .001$

determine the cause of these results, future research should be undertaken so the causes, when discovered, may be fully understood. The conclusion that the McGraw-Hill Study Skills test is a poor predictor of College Academic performance, does not preclude the possibility that it can be used as a good diagnostic tool.

To evaluate the diagnostic ability of the McGraw-Hill Study Skills test two (2) separate sets of analyses were performed. Inspection of Table 4 for the first set of analyses reveals that students with " one or more college courses failed " demonstrated lower scores on all the scales of the Study Skills test. These students, on the average, scored lower on the (a) Problem Solving scale - $\Delta\bar{x} = -0.47$, t (410)$= 2.06$, $p < .05$, (b) Underlining scale $\Delta\bar{x} = -0.64$, $t = 3.15$, $p < .005$, (c) Library Information scale $\Delta\bar{x} = -1.22$, $t = 3.78$, $p < .005$, (d) General Study Skills scale $\Delta\bar{x} = -0.82$, $t = 2.71$, $p < .01$, and (e) Total Study Skills score $\Delta\bar{x} = -3.11$, $t = 4.14$, $p < .05$.

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Insert Table 4 about here

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The results of further statistical analyses between students failing 50% or more of their College courses in the first semester and students not failing any courses are revealed in Table 5. It should be noted that the students failing 50% or more of their College courses scored significantly lower on the following Study Skills scales: (a) Problem Solving

TABLE 4

MEAN SCORES AND t-TESTS ON
THE SCALES OF THE McGRAW-HILL
STUDY SKILLS TEST FOR STUDENTS WITH NO
FAILURES AND STUDENTS WITH ONE OR MORE FAILURES
AT COLLEGE IN THE FIRST SEMESTER

STUDY SKILL	NO FAILURES (N = 166)		ONE OR MORE FAILURES (N = 246)		t-TEST FOR NO FAILURES vs. ONE OR MORE FAILURES	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	df	t
PROBLEM SOLVING	9.078	2.22	8.614	2.29	410	2.06*
UNDERLINING	5.729	2.13	5.089	1.87	410	3.15***
LIBRARY INFORMATION	10.741	3.40	9.52	2.92	410	3.78***
GENERAL STUDY SKILLS	10.958	3.07	10.142	2.90	410	2.71**
TOTAL STUDY SKILLS	36.482	8.00	33.37	6.64	410	4.14***

NOTE.--- * $p < .05$, two-tailed
** $p < .01$, two-tailed
*** $p < .005$, two-tailed

$\Delta\bar{x} = -0.62$, $t = 1.65$, $p < .05$, (b) Library Information $\Delta\bar{x} = -1.78$, $t = 2.70$, $p < .01$, and (c) Total Study Skills score $\Delta\bar{x} = -2.71$, $t = 1.72$, $p < .05$. The difference in scores for the Underlining and General Study Skills scales did not approach statistical significance. One-tailed tests of significance were used and were appropriate, because the Study Skill test to be an accurate diagnostic had to demonstrate where failing students were weak in Study Skills. From this evidence, it was therefore concluded that the McGraw-Hill Study Skills test may be successfully used as a diagnostic tool in assessing students Study Skill inadequacies; only if the students are already experiencing academic difficulty at College.

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Insert Table 5 about here

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Because of undocumented but'commonly held distinctions' between Social Science and Pure and Applied Science students, several analyses were performed to compare these two 'groups' of students. It was determined that the mean High School Average was 7.75 units lower for Social Science students than for Pure and Applied Science students, $t\ (246) = 6.16$, $p < .005$. On the average, Pure and Applied students failed 0.65 fewer courses in high school than Social Science students, $t\ (246) = 4.86$, $p < .005$. At college, in the first semester, both groups demonstrated significant decreases in College Average relative to their High School Average. For Social Science students the drop was from 61.30% to 57.96% whereas Pure and Applied Science students dropped from 69.04% to 63.80%.

TABLE 5

MEANS, STANDARD DEVIATIONS, AND t-TESTS
FOR FAILING 50% OR MORE COLLEGE COURSES AND
ENTERING COLLEGE STUDENTS

STUDY SKILL	ENTERING COLLEGE STUDENTS (N= 412)		STUDENTS FAILING 50% OR MORE COURSES (N= 22)		t-TEST	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	df	t
PROBLEM SOLVING	8.80	2.27	8.18	1.68	432	1.65*
UNDERLINING	5.35	2.00	5.59	2.13	432	0.52
LIBRARY INFORMATION	10.01	3.18	8.23	3.01	432	2.70**
GENERAL STUDY SKILLS	10.47	2.99	9.91	2.78	432	0.92
TOTAL STUDY SKILLS	34.62	7.37	31.91	7.18	432	1.72*

NOTE.---- * $p < .05$, One-Tailed
** $p < .01$, One-Tailed

The relative decline in academic performance, as measured by average of difference in course grades, is significantly greater for Pure and Applied Science students, t (246) = 11.08, $p < .005$. It was discovered, however, that there was no significant difference between the two groups in the number of college courses failed on the December examinations. Although this research was not designed to determine the causes of differences between Social Science and Pure and Applied Science students, note that documented differences now exist as to their relative performance in the two College programs.

On the Problem Solving scale it was found that Pure and Applied Science students demonstrated a mean score of 0.82 units higher than Social Science students, t (248) = 3.01, $p < .005$. Similarly Pure and Applied students scored higher than Social Science students for such scales as: (a) Library Information, $\Delta\bar{x} = 0.40$, t (248) = 2.97, $p < .005$, (b) General Study Skills, $\Delta\bar{x} = 0.37$, t(248) = 2.41, $p < .025$, and (c) Total Study Skills score, $\Delta\bar{x} = 3.14$, t(248) = 3.47, $p < .005$ (see Table 6). The only Study Skill scale where the students of these two programs did not demonstrate significant differences was for Underlining. Further research should be conducted to explain the possible cause or causes for those differences between Social Science and Pure and Applied Science students documented by this research.

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Insert Table 6 about here

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TABLE 6

MEAN SCORES AND t-TESTS ON THE
SCALES OF THE McGRAW-HILL STUDY SKILLS
TEST FOR STUDENTS IN SOCIAL SCIENCES
AND STUDENTS IN PURE, APPLIED, AND HEALTH SCIENCES

STUDY SKILL	SOCIAL SCIENCES (N = 129)		PURE, APPLIED, AND HEALTH SCIENCES (N = 123)		t-TEST	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	df	t
PROBLEM SOLVING	8.67	2.12	9.49	2.20	250	-3.01**
UNDERLINING	5.46	2.12	5.59	1.94	250	-0.53
LIBRARY INFORMATION	9.62	3.06	10.82	3.35	250	-2.97**
GENERAL STUDY SKILLS	10.23	2.85	11.11	3.01	250	-2.41*
TOTAL STUDY SKILLS	33.89	7.20	37.03	7.15	250	-3.47**

NOTE.--- * $p < .025$, two-tailed
** $p < .005$, two-tailed

To summarize, Experiment I determined that: (a) C.E.G.E.P. students are weaker in Library Information and General Study Skills than college level students in the U.S., (b) the McGraw-Hill Study Skills test is not a good predictor of College Academic performance but can be used as a diagnostic for students already experiencing academic difficulty at college, (c) students in the Pure & Applied Science program enter college with better high school grades than Social Science students, (d) College Academic performance of both Pure & Applied and Social Science students was lower than similar measures of high school performance, (e) that the decrease in academic performance from high school to college is greater for Pure & Applied Science students than for Social Science students, and (f) that relative to Social Science students the decline in Academic performance from high school to college is greater for Pure & Applied Science students. Further and more extensive research is needed to determine the cause or causes for the results differentiating between Social Science and Pure & Applied Science students.

EXPERIMENT II

This experiment was designed to evaluate whether the teaching of study skill techniques would improve students academic performance. Kusyszun (1970) and Jackson and Van Zoost (1972) did not find study skill techniques improved academic performance. Jackson and Van Zoost (1972) used randomly sampled subjects and a one-test method. This experiment used matched experimental and control groups with repeated measures on academic performance.

It was hypothesized that the teaching of study skill techniques would improve the subjects study skill scores. It was further hypothesized that the experimental subjects receiving study skills instruction would show a significant improvement in academic performance with a decrease in the number of courses failed.

METHOD

Subjects.--- The subjects were 34 first-year C.E.G.E.P. students attending Champlain Regional College, Lennoxville Campus. These subjects were categorized according to whether or not they had previously written the McGraw-Hill Study Skills test in September and further classified according to whether they attended this college in the fall semester (College Experienced subjects) or whether they were entering Champlain College in January (Entering Students). The data for three (3) subjects

in the Experimental group had to be eliminated from certain analyses because they had not written the Study Skills test in September. This left a total of nine (9) students who for certain analyses are referred to in this report as 'College Experienced'. The data for 10 students entering college in January was used in similar analyses, and referred to as data for'entering students'.

The subjects in the Experimental group were selected on the basis of poor academic performance during the previous semester, is a 'failing' semester average of less than 60% and/or having failed more than 25% of their academic courses, ie. excluding physical education, or voluntary enrollment in the study skills improvement program. Twelve (12) matched subjects were selected for the Control group from the 412 subjects involved in the testing for Experiment I, and were matched with the subjects of the Experimental group for college program and performance on the McGraw-Hill Study Skills test.

Apparatus and Material.--- The McGraw-Hill Basic Skills System, Study Test (1970), was used to measure study skills on the following scales: (a) Problem Solving, (b) Underlining, (c) Library Information, and (d) Study Skills Information. The study skills improvement program was based on workbooks in the McGraw-Hill Basic Skills System (1970) and 45 hours of lecture and laboratory material organized by the first author in the following areas: (a) Problem Solving, (b) Underlining, (c) Listening and Notetaking, (d) Library Information, and (e) General Study Skills.

Procedure.--- On the first day of class in the second semester, each subject filled out a personal information card prior to answering the McGraw-Hill Study Skills test. The nature and goals of this test were explained. Two (2) sample questions were given to familiarize the subjects with the testing procedures. Each of the four (4) sections of the test: Problem Solving, Underlining, Library Information, and General Study Skills Information, was immediately preceeded by specific directions. Each part was separately timed. Subjects received their results in class two (2) days later where further explanation of the results was available.

The subject in the Experimental group spent three (3) supervised hours each week in the Study Skills program. During the semester, each subject completed a minimum of two (2) improvement programs; at least one (1) improvement program in their weakest area of study skills as measured by the Study Skills Test. The Study Skills Test was readministered to the Experimental subjects at the end of the Study Skills program, with their results returned two (2) days later.

Results and Discussion.--- Because subjects with two different backgrounds were used to assess study skills improvement, the following terminology was adopted; " College Experienced " was used to denote students having one semester's college experience while " Entering students " referred to students beginning college in the winter semester. Since the experience of these two groups of students differed with respect to exposure to college courses, an analysis was

TABLE 7

MEANS, STANDARD DEVIATIONS, AND t-TESTS OF STUDY SKILLS TEST SCORES BETWEEN COLLEGE EXPERIENCED (TESTED IN THE FALL) AND ENTERING STUDENTS (JANUARY TESTED).

STUDY SKILL	COLLEGE EXPERIENCED (N= 9)		ENTERING STUDENTS (N= 10)		t-TEST	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	df	t
PROBLEM SOLVING	8 33	1.58	9.60	2.55	17	1.28
UNDERLINING	5.78	2.11	5.78	2.35	17	1.92
LIBRARY INFORMATION	10.11	3.14	9.80	2.78	17	0.23
GENERAL STUDY SKILLS	11.40	3.13	11.44	2.41	17	0.03
TOTAL STUDY SKILLS	35.67	7.26	34.60	7.60	17	0.31

NOTE. * $p < .05$, one-tailed

performed to see what significant differences, if any, existed between their Study Skills scores on the McGraw-Hill Study Skills Test.

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Insert Table 7 about here

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It was found that the College Experienced subjects, tested in September did not significantly differ from Entering students tested in January on the following study skills scales: (a) Problem Solving, (b) Library Information, (c) General Study Skills, and (d) Total Study Skills score (See Table 7). The college experienced subjects however had a mean Underlining score of 5.78 as opposed to a score of 3.80 for the Entering students. These two mean scores resulted in statistically significant different with t (17) = 1.92, $p < .05$ (See Figure 1). Since the College Experienced and Entering students only differed in knowledge of Underlining techniques, it is apparent that students are able to acquire these skills from exposure to college level courses.

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Insert Figure 1 about here

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Because the effects of Study Skills instruction upon the two types of subjects might be different, separate analyses were performed. It

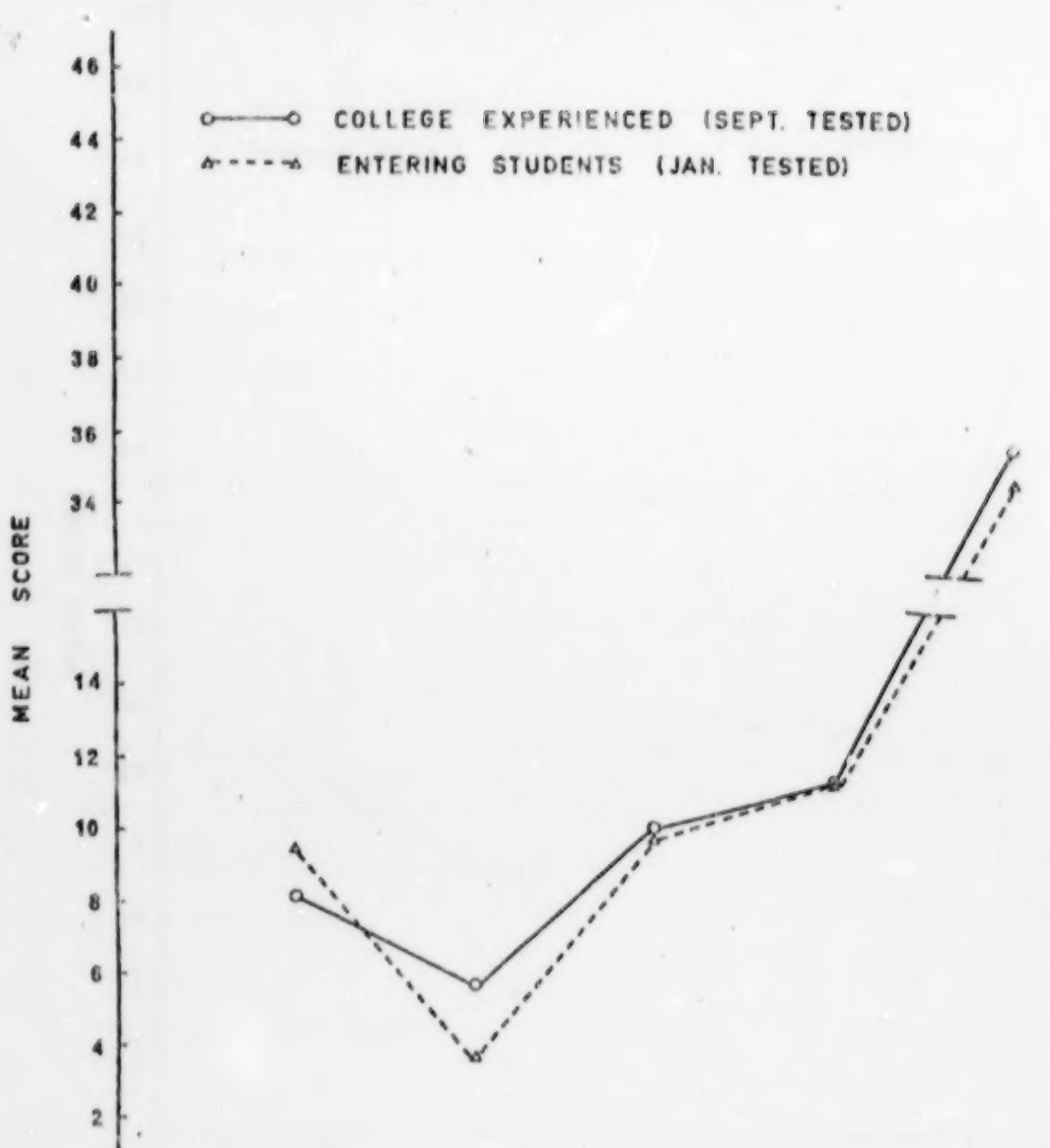

Figure 1. A diagrammatic representation of the different mean raw scores for College Esperienced students (tested in September) and Entering students (tested in January) on the following Study Skill Scales: Problem Solving (PS), Underlining (U), Library Information (LI), General Study Skills (GSS), and Total Study Skills Test score (TOT).

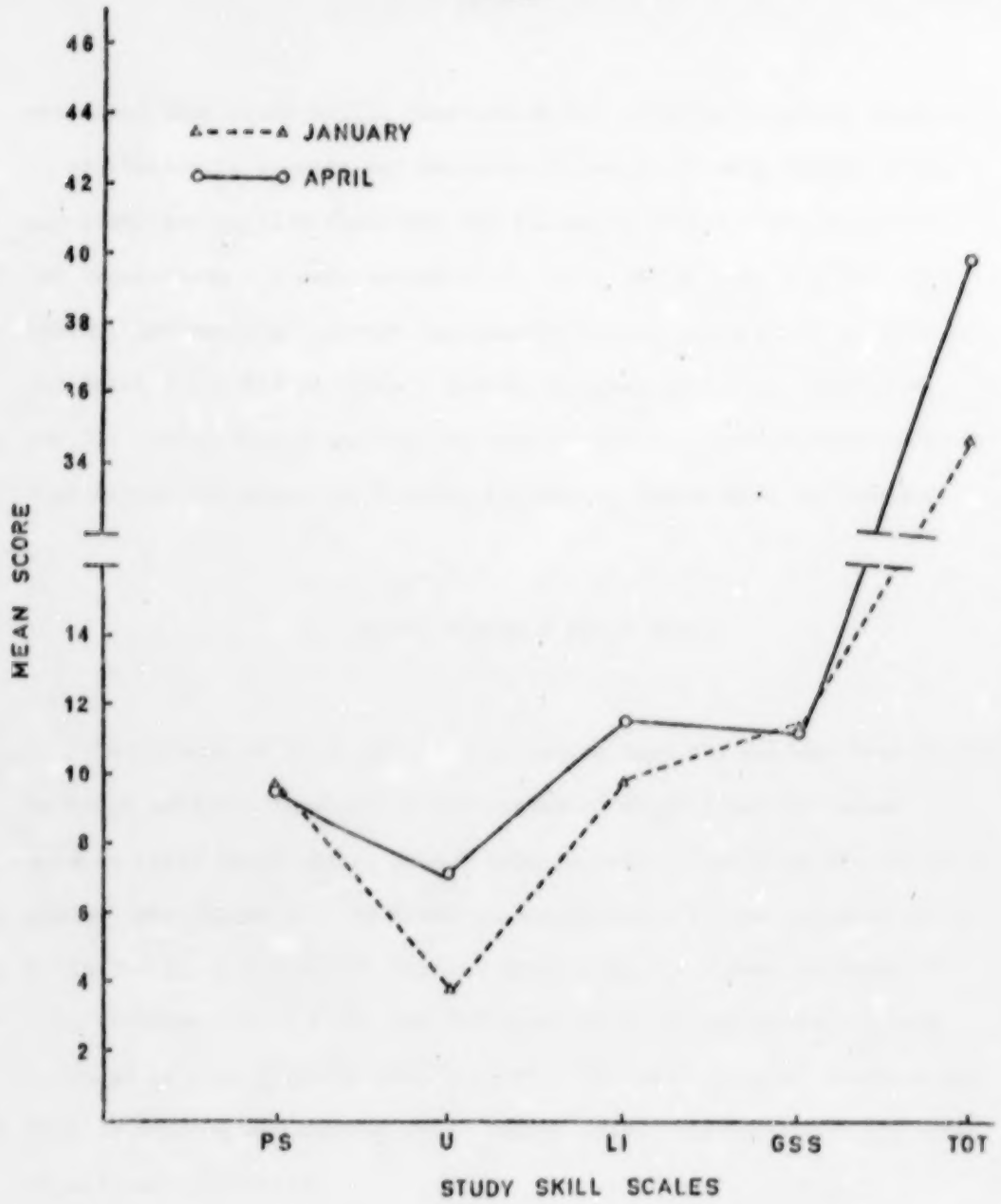

Figure 2. A diagrammatic representation of the different mean raw scores for Entering students (tested in January) and the same students (tested in April) on the following Study Skill Scales: Problem Solving (PS), Underlining (U), Library Information (LI), General Study Skills (GSS), and Total Study Skills Test score (TOT).

was found that Study Skills instruction for Entering students resulted in statistically significant increases between the mean scores of pre- and post- instruction tests for the following scales (see Figure 2): (a) Underlining - a mean increase of 3.4, t (18) = 3.74, $p < .005$, (b) Library Information - a mean increase of 1.8, t (18) = 2.43, $p < .05$, and (c) Total Study Skills score - a mean increase of 5.2, t (18) = 2.94, $p < .01$. Study Skills instruction however did not produce statistically significant increases for Problem Solving or Underlining techniques.

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Insert Figure 2 about here

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The effect of Study Skills instruction upon the College Experienced group of subjects resulted in statistically significant increases between their study skills scores from January to April on the following scales (see Figure 3): (a) Library Information - a mean increase of 3.0, t (16) = 4.25, $p < .005$, (b) General Study Skills - a mean increase of 1.2, t (16) = 2.34, $p < .05$, and (c) Total Study Skills score - a mean increase of 4.1, t (16) = 3.83, $p < .005$. For this group of students the Problem Solving and General Study Skills scales similarly did not show significant increases.

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Insert Figure 3 about here

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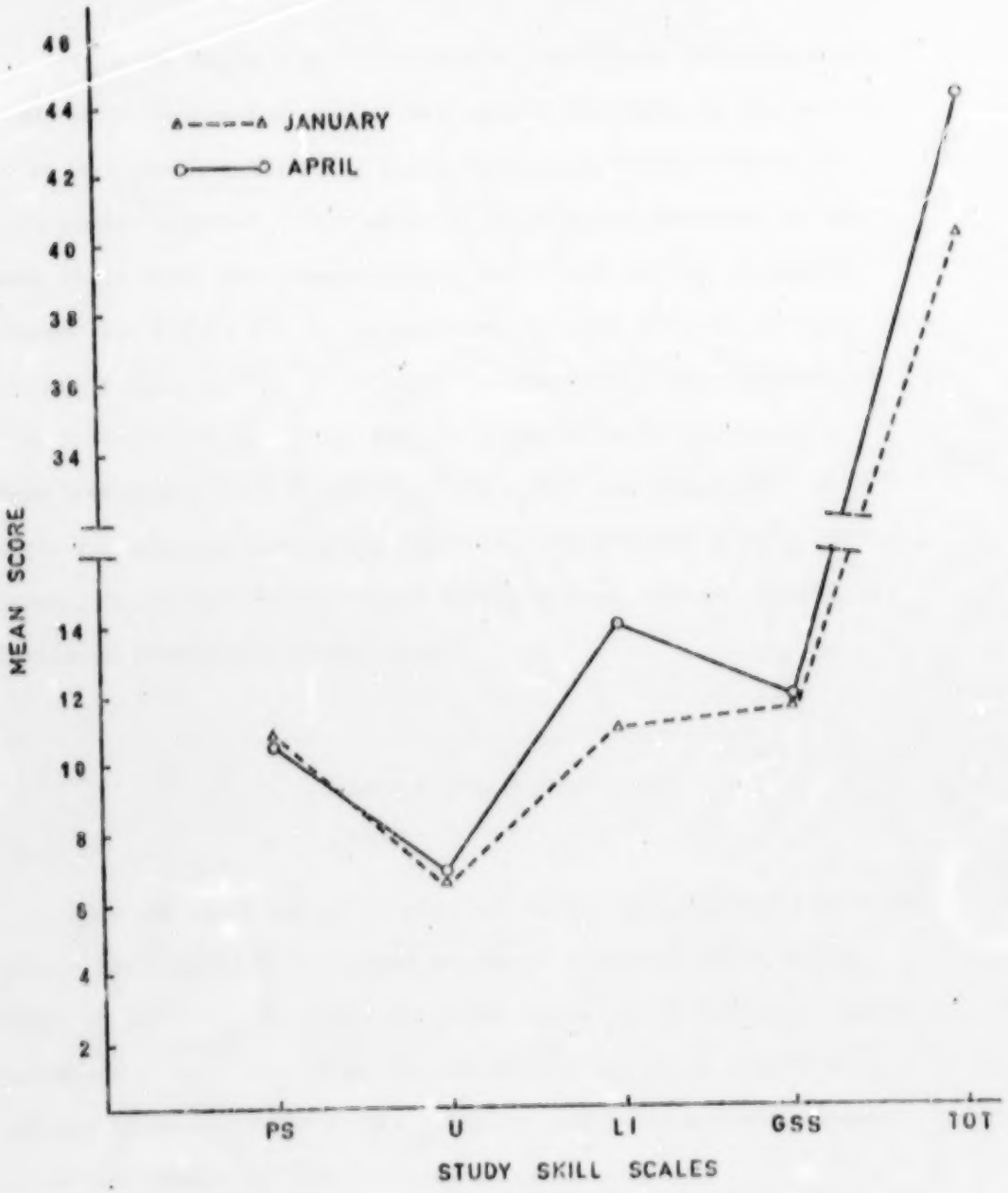

Figure 3. A diagrammatic representation of the different mean raw scores for College Experienced (tested January) and the same students (tested in April) on the following Study Skill Scales: Problem Solving (PS), Underlining (U), Library Information (LI), General Study Skills (GSS), and Total Study Skills Test score (TOT).

Since the pattern of statistically significant differences in Study Skill improvement scores was exactly the same, it was decided to do an overall analysis of Study Skills improvement scores for both groups combined. Statistically significant increases in the mean Study Skill improvement scores were found for the following scales (see Figure 4): (a) Underlining - a mean increase of 1.9, t (36) = 2.82, $p < .005$, (b) Library Information- a mean increase of 2.6, t (36) = 4.31, $p < .005$, and (c) Total Study Skills score- a mean increase of 4.7, t (36) = 4.54, $p < .005$ (see Figure 4). Once again for the combined groups analysis, both Problem Solving and General Study Skills improvement scores did <u>not</u> achieve acceptable levels of statistical significance.

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Insert Figure 4 about here

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From the above series of analyses it may be concluded that Study Skills instruction does improve students' scores on Study Skills test, at least for such techniques and skills as Underlining, Library Information, and Total Study Skills score. Yet to be evaluated is whether these increases in Study Skills test performance correspond to an improvement in College Academic performance.

To assess the effects of Study Skill instruction upon Academic performance, two groups of subjects were used. The Experimental

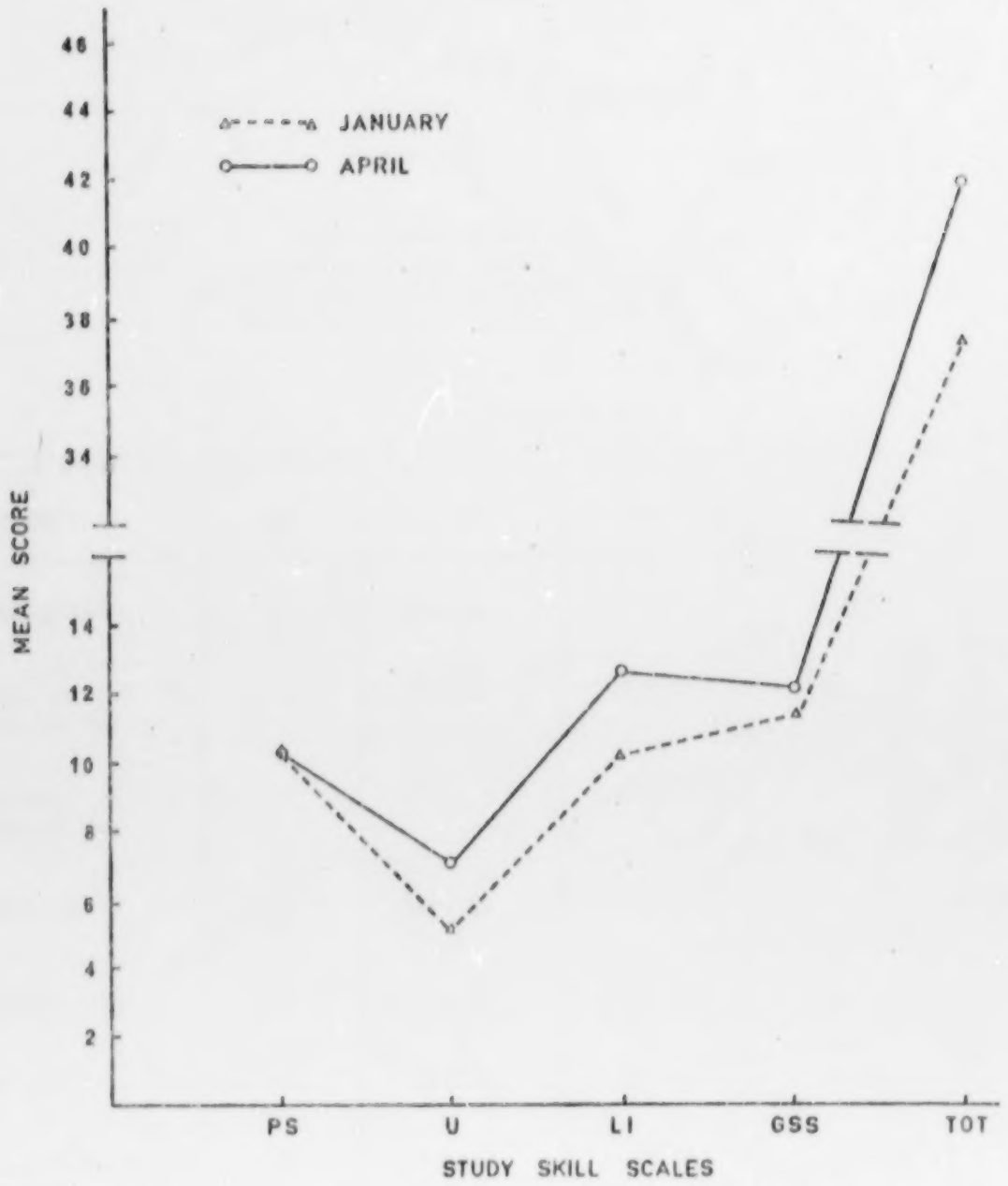

Figure 4. A diagrammatic representation of the different mean raw scores combining College Experienced and Entering students (tested in January) and the same students (tested in April) on the following Study Skill scales: Problem Solving (PS), Underlining (U), Library Information (LI), General Study Skills (GSS), and Total Study Skills Test score (TOT).

TABLE 8

ANOVA SUMMARY TABLE FOR
AVERAGE COLLEGE GRADES FROM
THE FIRST AND SECOND SEMESTERS BETWEEN
EXPERIMENTAL AND CONTROL GROUPS

SOURCE	df	SS	MS	F
BETWEEN Ss	23	6416.41		
Between Groups (G)	1	169.13	169.13	< 1
Within Groups (W)	22	6247.28	283.97	
WITHIN Ss	24	1619.02		
Trials (T)	1	0.19	0.19	< 1
T x G	1	352.64	352.64	6.13*
S x T Within Groups.	22	1266.19	57.55	

NOTE. -* $p < .025$, two-tailed

group was composed of 12 students with the only stipulation for inclusion being; their completion of the Study Skill instructional program and their having written examinations at this College in December. The 12 members of the Control group were matched to the Experimental group members on the basis of study skills test profile and college program. Members of the Control group were also required to have written college examinations in December but they did not follow the Study Skills instruction program.

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Insert Table 8 about here

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The ANOVA (Analysis of Variance Analysis) of Average Grades in college examinations yielded a significant Group x Trials interaction effect, $F(1,22)=6.93$, $p < .025$. Since there were no statistically significant main effects (see Table 8), the interaction effect was prepared graphically in Figure 5 to determine if it was of the 'X' variety. As seen in Figure 5, with approximately the same decrease for the Control group over the two semesters as an increase for the Experimental group over the same period; Gaito's (1973) contention was corroborated that the lack of main effects for Trials and Groups can be expected with certain types of 'X' interactions.

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Insert Figure 5 about here

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To determine if one group " improved " more than the other, a further set of analyses was performed on the College Average grades

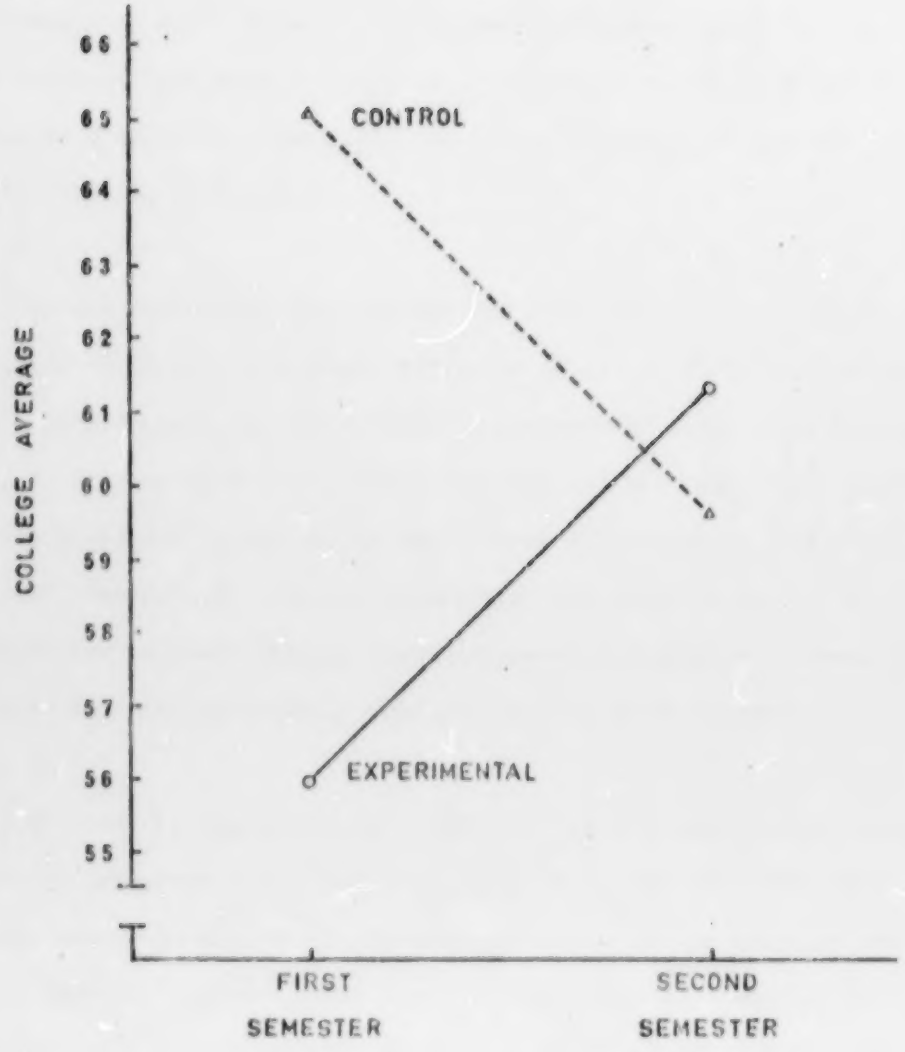

Figure 5. A diagrammatic representation of College Average Grades in the first and second semesters for the Experimental and Control Groups.

over the two semesters. The " improvement " score was calculated by subtracting the Average College grade of the December exams from the corresponding April values. A positive improvement score indicated the students' averages in April were superior to those in December. Likewise a negative value indicated poorer academic performance in April relative to December.

It was determined that the Control Group had a mean " improvement " score of -5.55 with a standard deviation (S.D.) of 11.03. Likewise the Experimental Group had an average improvement score of $\Delta\bar{X} = 5.28$ with an S.D. of 10.34. A t-test comparing the mean scores of the two groups yielded a statistically significant difference, $t\ (22) = 4.36$, $p < .005$, one-tailed. The hypothesis that the Experimental group (instructed in study skills) would demonstrate a greater increase in College Academic performance than the Control group supported.

It could be argued however, that the relative improvement of the Experimental group in the previous analysis was due to a decreased course load. An Analysis of Variance performed on the data for the total number of courses taken each semester, yielded a statistically significant Trials (semester) effect. $F\ (1,22) = 5.54$, $p < .05$ (see Table 9). Since the T x G interaction effect was not significant, the difference in total course load between each semester could not account for the T x G interaction effect for College Academic performance. It should be noted that an independent t-test analysis

TABLE B

ANOVA SUMMARY TABLE COMPARING
EXPERIMENTAL AND CONTROL GROUPS
FOR TOTAL NUMBER OF COURSES TAKEN
IN THE FIRST AND SECOND SEMESTERS

SOURCE	df	SS	MS	F
BETWEEN Ss	23	26.67		
Between Groups (G)	1	0.75	0.75	< 1
Within Groups (W)	22	25.92	1.18	
WITHIN Ss	24	15.00		
Trials (T)	1	3.00	3.00	5.54*
T x G	1	0.08	0.08	< 1
S x T Within Groups.	22	11.92	0.54	

NOTE.- * - $p < .05$, two - tailed.

indicated a statistically significant fewer number of college courses were taken in the second (April) semester, t (22)=4.05, $p < .005$.

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Insert Table 9 about here

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A similar analysis of variance performed upon data for the " number of college courses failed ", (see Table 10), yielded no significant main effects or interaction effects. Thus with factors such as " number of courses taken " and " number of courses failed " eliminated, the only possible way to explain the T x G interaction effect and relative improvement of the Experimental Group's College Academic performance is by the effects of study skills instruction.

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Insert Table 10 about here

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In summary, Experiment II has determined that college students', enrolled in a Study Skills Improvement Program, demonstrated improved Study Skills at its termination. These students demonstrated improved College Academic performance which would indicate that they had utilized their newly acquired skills. A measure of the Number of Courses Failed both before and during the Study Skills Improvement Program no statistically significant differences. Since there was no immediate reduction in the number of courses failed while at the same time their average grades at college improved, these students'

TABLE 10

ANOVA SUMMARY TABLE COMPARING
EXPERIMENTAL AND CONTROL GROUPS
FOR NUMBER OF COURSES FAILED
IN THE FIRST vs. SECOND SEMESTER

SOURCE	df	SS	MS	F
BETWEEN Ss	23	57.32		
Between Groups (G)	1	1.69	1.69	< 1
Within Groups (W)	22	55.63	2.53	
WITHIN Ss	24	30.65		
Trials (T)	1	0.67	0.67	< 1
T x G	1	3.52	3.52	2.93
S x T Within Groups.	22	26.46	1.20	

improvement in Study Skills was reflected in most of the courses they took. It was hypothesized that a reduction in the number of college courses failed is a 'latent effect' which would take a longer period of practice and use to be reflected in a measure such as the number of college courses failed.

GENERAL RECOMMENDATIONS

Based upon the results of the present research project the following is a list of recommendations which in my estimation are both of a primary nature and should receive implementation as soon as possible:

1. Since the present project results have raised more questions than they have reso'ved, it is recommended that: A LONG RANGE PROJECT BE INITIATED AND ADEQUATELY FINANCED TO STUDY THE UNKNOWN FACTORS CAUSING SOME OF THE UNEXPECTED RESULTS OBTAINED BY THIS PROJECT.

2. On the basis of the present research, I would recommend that Champlain College, Lennoxville Campus initiate a more extensive pilot project in the instructional aspects of Study Skills for all students experiencing academic difficulties and 'poor' Study Skill Scores.

3. It is further recommended that C.E.G.E.P. instructors heed the notice to 'take into account' their students weaknesses in Library information and General Study Skills when preparing and presenting their courses.

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APPENDIX I

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G DRIVE    CART SPEC    CART AVAIL   PHY DRIVE
0003         000F         000F         0000

Z M12    ACTUAL  8K  CONFIG  8K

/ FOR
TEST SOURCE PROGRAM
     2 150 600 001 030 700 000 420 002 060 070 100 150 380   001
     2 170 580 002 030 790 000 820 006 110 090 140 110 450   002
     2 170 580 002 030 680 000 700 000 110 090 160 100 460   003
     2 170 580 002 030 530 006         070 040 080 050 240   004
     1 170 580 002 020 750 000 670 001 120 080 100 140 440   005
     2 170 590 001 030 520 003 600 000 100 070 080 090 340   006
     1 170 640 001 010 770 000 730 000 120 070 180 140 510   007
     2 180 580 002 030 520 003 400 003 060 030 050 110 250   008
     2 190 640 004 040 630 000 590 001 080 090 110 130 410   009
     2 170 630 019 010 710 000 730 000 110 040 150 100 400   010
     2 170 580 002 010 700 000 650 000 080 030 110 150 370   011
     1 170 380 003 030 750 000 690 000 080 030 110 040 260   012
     1 200 090 218 410 630 000 710 000 080 050 150 080 360   013
     1 130 503 004 010 680 000 520 001 090 020 100 090 300   014
     1 160 490 012 030 710 001 130 004 100 080 080 080 340   015
     1 180 018 025 040 490 003 450 003 070 040 060 100 270   016
     2 170 580 002 030 630 000 650 000 070 040 110 100 320   017
     1 150 400 001 010 660 002 620 001 090 040 160 120 410   018
     1 130 270 024 035 660 000 150 004 070 030 050 050 200   019
     1 170 749 711 030 670 000 600 001 070 030 070 100 270   020
     1 200 090 034 010 570 001 720 001 070 070 140 070 350   021
     2 130 999 999 010 720 000         100 050 120 120 340   022
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     2 130 580 002 351 560 002 460 006 060 030 070 070 230   024
     2 200 084 202 030 530 003 660 002 080 080 090 130 380   025
     1 130 580 002 030 610 002 200 006 090 060 070 100 320   026
     1 160 580 003 040 630 000 600 002 060 060 050 070 240   027
     1 170 580 002 020 830 000 800 000 120 060 150 170 490   028
     2 170 580 003 351 420 001         100 060 110 130 400   029
     2 130 580 003 040 580 000 640 002 120 060 110 130 420   030
     2 150 570 011 030 700 000 750 000 070 080 120 110 380   031
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     1 130 739 054 351 580 001 430 002 100 050 050 100 300   034
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     2 000 999 999 060 999 999 770 000 050 010 020 030 110   036
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     2 190 610 001 412 740 000 760 001 030 070 060 070 280   038
     2 180 739 087 351 570 000 630 002 090 080 080 130 380   039
     2 170 600 001 020 720 000 810 000 080 060 140 130 410   040
     1 170 270 544 020 550 002 630 001 120 040 040 060 260   041
     1 130 530 002 030 530 001         080 060 090 070 300   042
     2 170 686 002 420 660 001 630 001 110 070 080 130 390   043
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     1 130 999 999 010 680 000         090 050 130 100 370   047
     2 180 600 001 351 530 002 650 001 060 030 030 110 230   048
     2 170 580 003 010 670 000 650 002 070 010 070 070 240   049
     2 160 580 002 351 740 000 820 000 100 060 110 140 410   050
```

2	170	580	002	351	540	001			070	070	130	120	390			051
2	160	630	003	412	530	004	720	000	080	050	090	110	330			052
1	170	580	002	020	770	000	720	000	120	030	130	150	430			053
1	180	210	011	070	530	000	000	000	060	030	050	080	220			054
1	170	719	027	010	800	001	800	000	060	070	050	080	260			055
1	170	580	002	390	650	000			090	060	160	090	390			056
2	180	580	002	030	580	000	660	000	060	040	110	100	310			057
2	160	580	002	070	580	001	660	006	120	020	080	110	330			058
2	170	580	004	030	640	001	730	000	080	080	090	090	340			059
2	170	580	002	351	580	000	650	001	040	070	120	070	300			060
2	170	083	202	030	500	000	180	004	090	040	110	150	390			061
2	170	659	002	020	590	000	670	000	090	080	080	110	360			062
2	170	580	002	010	610	000	600	001	120	080	070	060	330			063
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2	150	520	002	070	830	000	800	000	110	050	170	100	430			065
2	160	580	002	020	640	000	540	004	070	040	100	110	310			066
1	170	580	002	040	570	000	660	000	090	010	060	060	220			067
1	170	580	002	010	760	000	830	000	080	060	060	060	260			068
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2	170	050	009	060	620	001	640	000	070	020	070	110	270			071
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2	170	580	002	030	560	003	620	001	100	080	110	130	420			073
2	170	560	002	010	630	000			090	060	070	120	340			074
2	170	580	003	030	440	002	650	000	050	020	010	060	140			075
2	170	570	008	351	610	002	650	000	070	060	130	080	340			076
1	170	600	001	020	720	000	730	000	100	060	130	080	370			077
1	170	600	001	040	530	002	430	002	080	030	100	110	320			078
1	170	600	001	020	750	000	560	003	110	060	070	110	350			079
1	170	580	002	010	710	000	690	000	060	060	120	130	370			080
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